

Free Energy, Equilibrium, and Redox Problems

For each of the following reactions, write a balanced equation, calculate E° for each cell, calculate ΔG° at 298 K, and calculate the equilibrium constant for each reaction at 298 K.

- (a) Aqueous iodide ion is oxidized by silver metal.
- (b) In acidic solution, copper (I) ion is oxidized by nitrate ion.
- (c) In basic solution, solid chromium (III) hydroxide is oxidized by hypochlorite ion.

At 298 K a cell reaction has a standard electrode potential of +0.17 V. The equilibrium constant for the cell reaction is 5.5×10^5 . What is the value of n for the cell reaction?

Predict whether the following reactions will be spontaneous under standard conditions:

- (a) oxidation of Sn to Sn^{2+} by I_2
- (b) reduction of Ni^{2+} to Ni by I^-
- (c) reduction of Cu^{2+} to Cu by Fe^{2+}

Calculate the equilibrium constant for the disproportionation of the copper (I) ion to copper metal and copper (II) ions.